fluid to fill the gap but prevents the fluid from flowing through the gap ... under an operating pressure differential..."

The terms "continuous gap" and "uniform gap" are defined on page 6, lines 10-22, of the instant specification. The term "continuous gap" "means that the sealing member and the moving member do not have any points of direct contact." The term "uniform gap" means that the distance between the moving and the stationary member does not vary significantly so as to compromise the hydraulic seal formed therebetween.

As explained on page 6, lines 23-30, of the specification, it is an unexpected discovery of the present invention that the size of the gap between a moving and a stationary member may be selected to allow the fluid to fill the gap, thus avoiding a dry friction, but to prevent the fluid from flowing through the gap. It is believed that when the clearance gap is sufficiently small, the adhesive forces of the fluid toward the piston and the seal are greater than the force exerted by the fluid due to an operating pressure, thus preventing the fluid from flowing through the gap (page 6, lines 23-30).

The '424 patent does not anticipate independent claims 1 and 7, because it does not teach a continuous gap as defined in the present specification. To the contrary, the '424 patent requires loading the seal "radially against the rod by an initial interference fit and/or an external loading system" to provide "intimate contact ... between the central section of the seal and the surface of the rod" (column 3, lines 15-21).

Also, the '424 patent does not teach a uniform gap. Instead, the '424 patent teaches a gap of a variable size. Under the static conditions, there is no gap at all ("intimate contact") between the seal and the rod (column 3, lines 18-21). As the rod starts moving, "[o]n the upstroke, lubricant is drawn into the convergent passage 26 where hydrodynamic pressures are generated. The pressures expand the seal gland to produce a clearance between the rod and the seal gland which is filled by a lubricant film" (column 3, lines 30-39). Thus, as the lubricant is drawn between the seal and the rod, the size of the gap therebetween varies from no clearance in the

area in front of the lubricant to some clearance in the area where the lubricant has already entered.

Finally, the '424 patent does not teach a gap between the sealing member and the moving member that prevents the fluid from flowing through the gap. To the contrary, the '424 patent teaches a gap that, on the down stroke, allows the oil to pass between the seal and the rod (column 4, lines 51-54).

The '424 patent does not make instant claims 1 and 7 obvious because it teaches away from the present invention. The '424 patent is directed to "a lubricated piston rod seal which inhibits gas leaking from a high pressure chamber on one side of the seal to a low pressure chamber on the other side of the seal" (abstract). As explained above, the '424 patent relies on the radial compression of the seal against the rod to inhibit gas leaking under static conditions. Thus, under static conditions, there is no gap whatsoever between the seal and the rod. As the rod starts reciprocating, a non-uniform clearance forms between the seal and the rod, as a result of hydrodynamic pressure from the lubricant. Finally, the '424 patent teaches a gap that, on the down stroke, allows the oil to pass between the seal and the rod.

Therefore, in view of the teachings of the '424 patent, the ability to form an effective seal with a continuous gap that has an initial uniform width that remains uniform under working pressures would not have been expected by those skilled in the art. Therefore, claims 1 and 7 are neither anticipated nor rendered obvious by the '424 patent. Claim 3 depends from claim 1 and is also patentable over the '424 patent.

Claims 2 and 8 are rejected under 35 U.S.C. §103(a) as being unpatentable over the '424 patent in view of Holland, U.S. Patent No. 4,501,120 (the '120 patent). This rejection is respectfully traversed.

The '120 patent does not remedy the defect of the '424 patent and is not relied upon by the Examiner for such. The '120 patent is cited by the Examiner for the teaching of the sealing member and moving member made of ceramic materials. The '120 patent has no teaching whatsoever of a continuous and uniform gap

between the sealing member and the moving member that prevents the fluid from flowing through the gap. To the contrary, the '120 patent requires that "... the clearance seal around the piston assures ... leakage [of gas] in each direction past the piston" (column 5, lines 65-68). Therefore, claims 1 and its dependent claim 3 are patentable over the '424 patent in view of the '120 patent.

Claims 1, 3-7 and 9-11 are rejected under 35 U.S.C. §103(a) as being unpatentable over Kostohris, U.S. Patent No. 5,493,954 (the '954 patent) in view of the '424 patent. This rejection is respectfully traversed.

The '954 patent teaches a seal assembly comprising a high-pressure seal and annular-low pressure seal that surrounds the sleeve seal and compresses it against the plunger (column 1, lines 54-59). The Examiner conceded that the '954 patent does not teach "a uniform and continuous gap between the seal and moving member" as required in the present invention, but relied on the '424 patent for teaching the same. However, as discussed above, independent claims 1 and 7 are patentable over the '424 patent because it neither teaches nor suggests a uniform and continuous gap between the seal and moving member that prevents the fluid from flowing through the gap. Since the '954 patent does not remedy the defect of the '424 patent, independent claims 1 and 7 and their dependent claims 3-6 and 9-11 are patentable over the '954 patent in view of the '424 patent.

In view of the foregoing, it is respectfully submitted that the application is in condition for allowance. Reexamination and reconsideration of the application, as amended, are requested.

If for any reason the Examiner finds the application other than in condition for allowance, the Examiner is requested to call the undersigned attorney at the Los Angeles, California telephone number (213) 337-6700 to discuss the steps necessary for placing the application in condition for allowance.

If there are any fees due in connection with the filing of this response, please charge the fees to our Deposit Account No. 50-1314.

Respectfully submitted,
HOGAN & HARTSON L.L.P.

Date: September 25, 2002

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